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Transmission Constraints to Geothermal Resource Development

CEC IEPR Committee Workshop

April 11, 2005

Overview

- **SDG&E's Past Experience with Geothermal**
- **Geothermal Benefits and Challenges**
- **Existing Transmission Constraints**
- **A New 500 kV Transmission Line Provides Greater Access**
- **Renewable Benefits of Transmission**

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Our Past Experience

- **1970's – SDG&E joined with Magma Power Company in drilling exploratory geothermal wells in Imperial Valley**
- **1984 – SDG&E completed the Southwest Powerlink (SWPL) 500 kV transmission line connecting San Diego to Arizona**
- **1984 – SWPL project included a 230 kV line connecting Imperial Valley/Mexicali and a second 230 kV line connecting San Diego/Tijuana**
- **1980's – SDG&E tapped into geothermal energy produced at Cerro Prieto, near Mexicali**
- **1980's – SDG&E developed 45 MW Heber Binary Cycle Geothermal research project in Imperial Valley**
- **2000's – SDG&E evaluating new geothermal projects**

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Geothermal Benefits & Challenges

- **Promising geothermal projects in Imperial Valley could help SDG&E meet its renewable energy goal by 2010**

- **What are the benefits**
  - Approximately 1000 to 2000 MW potential in IV (including existing plants)
  - Provides greater reliability compared to other renewables (i.e. steady base load power)
  - Provides significant amount of renewable energy resources for California
  - Provides Renewable Energy Credits

- **Major challenges**
  - Access – lack of transmission to geothermal “hot spots”
  - Cost – Price of geothermal compared to other renewable resources
  - Environmental – mitigation of environmental impacts adds to cost

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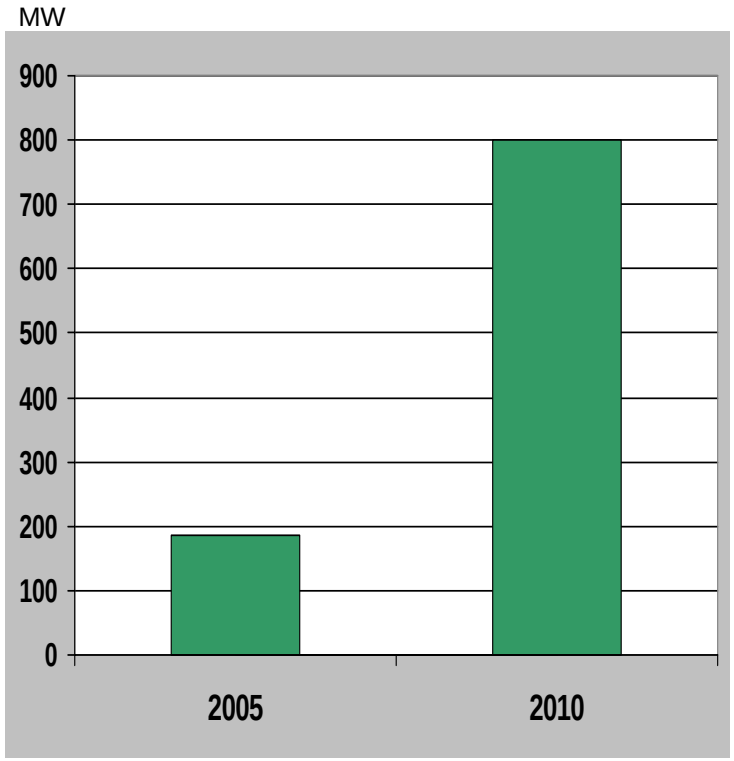
Planned Renewable Additions

- **SDG&E's goal is to provide 20 percent of region's energy from renewable sources by 2010**
- **The San Diego region will provide some renewable power; Imperial Valley has promising geothermal and solar**
- **A new transmission line is needed to access renewable sources both inside and outside the County to meet our 20 percent goal by 2010**



Planned Renewable Additions 2004-2010

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Existing Transmission Constraints

- **SDG&E connected to Mexico and Imperial Valley**
  - Through Southwest Power Link (SWPL)
  - The 230 kV lines to Mexico
  - Terminating at Miguel Substation
- **Miguel is limited by its outlet capability**
  - 1200 -1500 MW
  - Heavily congested with Arizona and Imperial Valley Generation
- **The Miguel-Mission 230 kV #2 project will increase the limit at Miguel Substation**
  - 1600 -1900 MW
- **A New 500 kV line out of Imperial Valley would alleviate this congestion**

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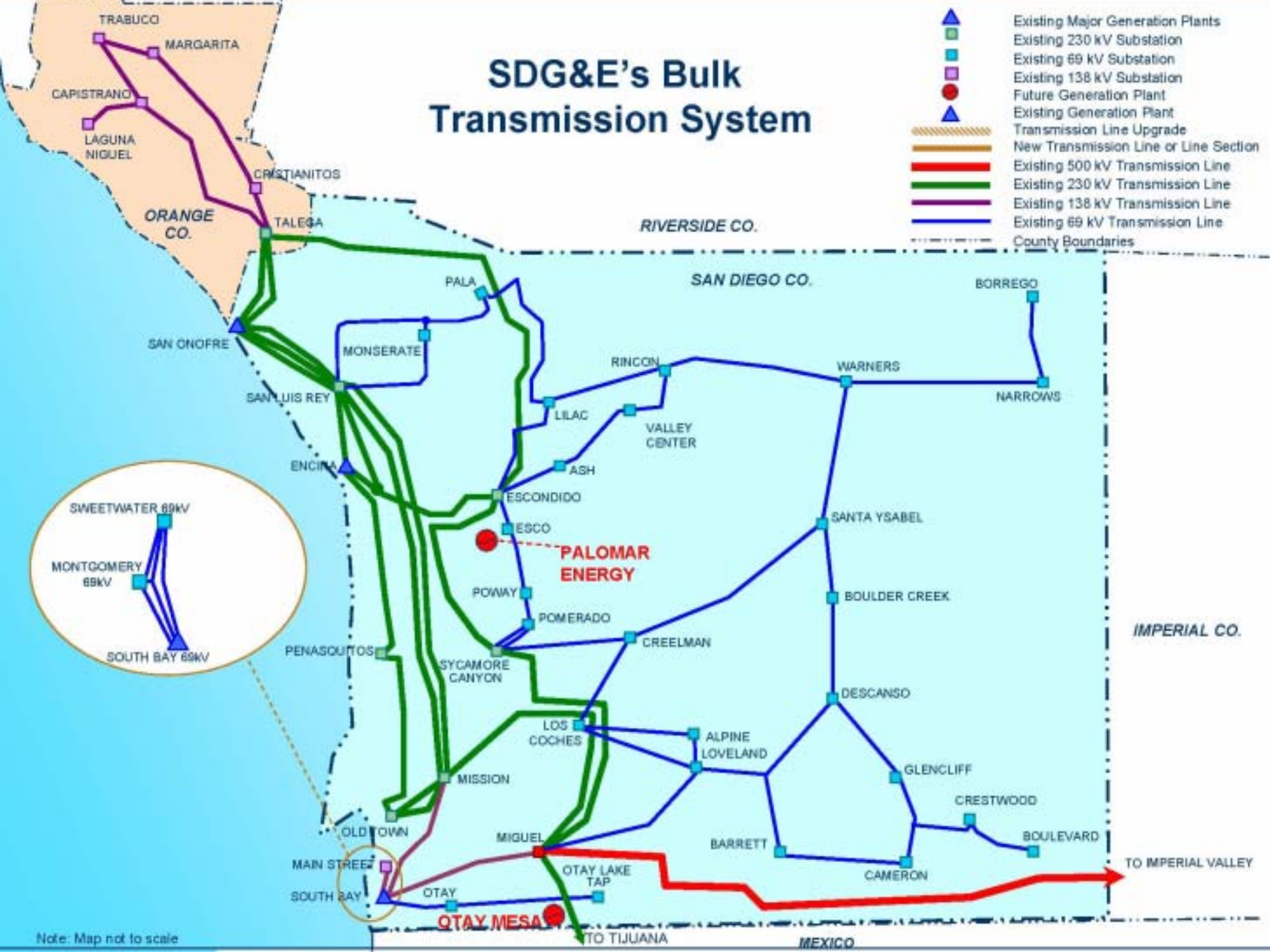
SDG&E's Bulk Transmission System
Existing Major Generation Plants
Existing 230 kV Substation
Existing 69 kV Substation
Existing 138 kV Substation
Future Generation Plant
Existing Generation Plant
Transmission Line Upgrade
New Transmission Line or Line Section
Existing 500 kV Transmission Line
Existing 230 kV Transmission Line
Existing 138 kV Transmission Line
Existing 69 kV Transmission Line
County Boundaries
ORANGE CO.
RIVERSIDE CO.
SAN DIEGO CO.
IMPERIAL CO.
MEXICO
TRABUCO
MARGARITA
CAPISTRANO
LAGUNA NIGUEL
CRISTIANITOS
TALEGA
SAN ONOFRE
PALA
MONSERATE
SAN LUIS REY
ENCINA
RINCON
LILAC
VALLEY CENTER
ASH
ESCONDIDO
ESCO
PALOMAR ENERGY
POWAY
POMERADO
PENASQUITOS
SYCAMORE CANYON
MISSION
OLD TOWN
MAIN STREET
SOUTH BAY
OTAY
OTAY MESA
TO TIJUANA
MIGUEL
OTAY LAKE TAP
LOS COCHES
ALPINE
LOVELAND
CREELMAN
SANTA YSABEL
BOULDER CREEK
DESCANSO
GLENCLIFF
CRESTWOOD
BOULEVARD
CAMERON
BARRETT
TO IMPERIAL VALLEY
BORREGO
WARNERS
NARROWS
SWEETWATER 69kV
MONTGOMERY 69kV
SOUTH BAY 69kV
Note: Map not to scale

Needs for a new 500kV transmission line

- **To provide reliable transmission service for SDG&E customers by delivering efficient and reliable energy**
- **To provide access to renewable energy, especially geothermal located in the southwest desert**
- **To improve reliability for San Diego and CAISO by enhancing California's 500kV electric grid, consistent with the CAISO's long-term concept of adding a 500kV loop through Southern California**
- **To provide economic benefits by eliminating a costly "bottleneck" in Southern California**

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Transmission Options to Consider

- **An Imperial Valley to San Diego 500 kV interconnect**
- **A northern 500 kV interconnect (Lake Elsinore Pumped Storage Project)**
- **A complete 500 kV loop that includes the IV to San Diego and continue to the north**
- **Upgrades to the existing 230 kV US/Mexico system**

SDG&E is studying transmission alternatives and will identify preferred alternatives

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Studies and Outreach Are Under Way

- **Stakeholder Input**
  - SDG&E, CAISO, CEC, and others are conducting a six-month study of potential transmission solutions for the region
  - A preferred alternative will be determined through an open stakeholder process
- **State Agency Support is Critical**
  - The CPUC adopted SDG&E Long Term Resource Plan and encouraged SDG&E continue planning efforts
  - The CEC will evaluate and adopt strategies this year for transmission, renewables and generation
- **Local Outreach**
  - We are seeking input from throughout the region in an open and public process

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Next Steps

SDG&E must move forward today to ensure adequate transmission in the future

- **We are working with stakeholder to finalize need for a new 500 kV Transmission Line as soon as possible**
- **We are committed to working with the community, resource agencies, and environmental groups on routing solutions**
- **We expect to file an application for a new 500 kV Transmission Line as soon as possible**

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More Information

Get more information about the need for a new 500kV transmission line and support SDG&E's efforts to improve the region's energy infrastructure

Visit the Web: www.sdge.com/newline

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